Contents

Section 17

West Desert Basin

Water Conservation

17.1 INTRODUCTION

This section discusses water conservation needs, issues, and potential alternatives, and makes recommendations for conserving water. In the State Water Plan, water conservation is defined as "wise use," which is much wider in scope than merely reducing water consumption. Presently, state water policy on conservation requires project sponsors seeking financial assistance from the state to prepare a Water Management and Conservation Plan.

Significant water use reductions can be, and have been, achieved when people understand the reasons to conserve, especially in times of drought. It must be remembered, though, that reducing demand for water is less important if there are no cost savings or if the water cannot be used for other desirable purposes.

Water conservation can be pursued through three strategies: (1) reducing water demand, (2) using the existing water supply more efficiently, and (3) increasing the water supply by operating the storage and delivery facilities more efficiently such as the elimination of conveyance losses, or through other means.

Examples of reducing the water demand are: increasing crop irrigation efficiency, restricting outside use, changes in landscaping practices, new efficient plumbing fixtures (i.e., low-flow toilets and low-flow shower nozzles), incentive pricing, and water education. Examples of using water more efficiently are: secondary (dual) systems, wastewater reuse, water right transfers, and conjunctive use. Examples of minimizing water losses are repairing and lining canals, leak detection programs, and efficient timing of water releases from storage facilities. All of these strategies can have valid applications in the West Desert Basin.

To guide the management of water development projects, the Board of Water Resources has issued a policy statement that supports conservation and the wise use of water. It states that water conservation will be examined both as an alternative and a supplement to project proposals.

17.2 BACKGROUND

Whenever water is discussed in Utah, the term conservation will most likely be included. Water is a finite resource and the demands on its use are growing. However, future water shortages in this basin will more likely be the product of long-term drought and infrastructure problems than dramatic increases in municipal and industrial water demands. Since many of the basin's existing communities and their projected growth are quite small, many communities have existing water supplies that will be adequate for quite some time. One exception is Tooele Valley area which has experienced significant growth over the past decade and is expected to continue to experience a high population increase over the next couple of decades. The Wendover area is also projected to experience significant growth over the next couple of decades. Consequently

M&I water conservation for Wendover and Tooele Valley will likely be a growing issue as these communities increase in population and their existing water supplies are stretched to their limits. Throughout the rest of the basin, water conservation should be implemented where it can be shown to be a benefit to the community.

17.3 WATER CONSERVATION OPPORTUNITIES

This section includes a discussion of both municipal and industrial (M&I) conservation and agricultural water conservation practices. Agricultural water is typically untreated and of poorer quality than water designated for human consumption. By definition, M&I refers to all public water use. Therefore, untreated "secondary" water is included in the broad category of municipal and industrial water. The vast majority of M&I water, however, is treated culinary water delivered through public water systems. It is used for residential, commercial and industrial uses, and is most often treated to meet the regulatory standards for drinking water. Consequently, M&I water is expensive, especially when compared with the price of agricultural water. Obviously, water conservation strategies for these two types of water use are different.

Effective conservation programs combine activities designed to reduce the demand for water with measures to improve efficient delivery systems. Demand reduction should include educating customers on improving cropland and residential irrigation practices and landscape design. Culinary water demand reduction is also helped with a pricing schedule that provides customers an incentive to find ways to use water more efficiently. Delivery efficiency can be improved by system audits and installing new meters and other facilities to reduce measurable losses.

17.3.1 Water Conservation Advisory Board

The 1995 publication of various water conservation recommendations by the Utah Water Conservation Advisory Board offers a number of programs and means to effectively conserve a substantial percentage of M&I water. These recommendations include: 1) development of water management and conservation plans by major water provider agencies, 2) reduction of secondary water by replacing high water consuming landscaping with xeriscaping or landscaping with reduced water needs, 3) better overall management of water intensive businesses and large conveyance systems, and 4) implementation of water pricing measures/policies.

17.3.2 Agricultural Water Conservation

A land-use inventory for the Columbia River Drainage, completed in 1991, determined irrigated agricultural lands cover 4,870 acres. A land-use inventory for the Great Salt Lake Desert (The West Desert Basin excluding the Columbia River Drainage) completed in 1993, determined irrigated agricultural lands covered 78,700 acres. The current water right allotment within the basin is four acre-feet per acre. This means ideally up to 314,800 acre-feet of water could be diverted annually for irrigation in the Great Salt Lake Desert and up to 19,480 acre-feet of water can be diverted in the Columbia River Drainage. In contrast to these allocation figures, Table 10-2 shows that only an estimated 181,700 acre-feet of water is diverted for irrigation in the basin, including 12,200 acre-feet of estimated diversion in the Columbia River Drainage. Irrigators in the Columbia River Drainage divert only 63 percent of their allocated water right, while irrigators in the rest of the West Desert Basin divert only 57 percent of their allocated water right.

Of the four acre-feet allotment, about 2.3 acre-feet per acre is based on crop consumption. The remaining 1.7 acre-feet per acre is based on conveyance and application

losses. Even if the conveyance and application losses could be entirely eliminated, the basin's irrigators would still need every bit of water they are currently diverting, and it still would not meet their crop consumption needs. Consequently, there is little opportunity for agricultural water conservation in the West Desert Basin. That is to say, agricultural water conservation would not result in reducing the amount of water diverted or consumed. Improving conveyance and application efficiencies would, however, stretch existing supplies to later in the season where storage is available and could result in higher crop yield.

Sprinkler irrigation

17.3.3 Municipal and Industrial Water Conservation

The 1998 Water Conservation Plan Act requires all water conservancy districts and water retailers serving more than 500 connections to prepare water conservation plans. These were to be submitted to the Division of Water Resources. Within the larger communities of Tooele and Grantsville, there are some effective water conservation measures that could be employed to reduce municipal water use. In any system there are unmetered water use and system losses. Although the unmetered uses include fire fighting and park watering, there is still potential for conserving residential water through maintenance and monitoring. Also, programs that improve efficiency of large landscaping systems, such as parks and cemeteries, can realize significant water reductions.

For smaller communities unmetered water use and system loss likely exists. As long as the existing supplies are adequate, such losses will probably go unchecked. But when existing supplies are stretched to their limits, it will be wise for such communities to consider conserving their existing supplies through metering and maintenance.

Residential Water Conservation - There are opportunities for conservation of residential water. Water-efficient appliances such as low-flow toilets and low-flow shower heads are only required in new construction. Most wholesale and retail water delivery price structuring provide little incentive for water conservation. The most inefficient use of residential water is over-watering of lawns and gardens. Education coupled with price incentives could accomplish a lot in terms of conserving residential water.

Commercial Water Conservation - Opportunity for water conservation is more limited in the commercial sector than in the residential sector. In fact, some commercial endeavors, such as laundries, have already implemented water conservation to reduce energy costs. It is likely, however, water pricing incentives and pretreatment of wastewater requirements would further motivate commercial businesses to reevaluate their water conservation efforts.

Industrial Water Conservation - Water pricing incentives will likely have a positive impact upon industries that receive water from public water systems.

17.4 CONSERVATION METHODS AND STRATEGIES

A wide range of water conservation methods have been employed in various regions of the country. The lessons learned in other states can be useful to Utah. However, it should be kept in mind that the outcome can be affected by differing circumstances. The following paragraphs provide a brief description and

discussion of the conservation methods and strategies expected to produce the most favorable impacts in the West Desert Basin.

17.4.1 Institutionalizing Water Conservation

An effective water conservation program requires a cooperative effort by all segments of the public. One way to achieve this would be through an active water education and conservation program conducted by the public water utilities.

17.4.2 Public Information/Education

Since everyone is a water user, any significant gain in conservation is an accumulation of individual attitudes and efforts. Therefore, public education is essential in conserving water. The degree of success will be directly proportional to the public perception of the need for water conservation. Every public agency or private organization concerned with planning, developing or distributing water can make a difference through efforts in this regard. In Utah, water conservation materials are regularly mailed out to schools, water-user organizations, and individuals on request. These materials are part of a water education program by the Division of Water Resources. Other conservation objectives of the division's education program include water-efficient landscaping and gardening techniques and conversion to more efficient appliances such as low-flow toilets and low-flow shower heads. Educational programs continue to be directed at students in elementary and secondary schools assisted by Project WET, a consortium of water education agencies throughout the United States.

17.4.3 Water Measurement

Accurate measurement of water encourages conservation in several ways. Not only is each user assured a fair and equitable distribution and financial assessments, it is also a more business-like way to operate a system and maintain records. Where users pay according to the quantity of water they actually use, there is a built-in incentive to conserve, whether the use is irrigation, municipal, or industrial. Most community water systems are metered. However, there are properties, such as city parks, golf courses, and cemeteries, which lack meters.

Xeriscape

17.4.4 Landscaping and Home Water Savings

Reductions in per capita use of municipal water require changes in personal habits and traditional practices, both inside and outside the home. This requires a public perception of need, but it can produce significant savings.

- Inside, residents can install water-saving toilets and shower heads, check plumbing for leaks, take shorter showers, use automatic dishwashers and washing machines only for full loads, and avoid having faucets run for unnecessarily long periods while shaving or rinsing vegetables, dishes and other items.
- Outside, residents can avoid using a hose to clean driveways and stop letting water run constantly while washing a car. Landscaping practices can also be improved. The Division of Water Resources teaches and encourages the installation and planting of water-conserving landscapes. The principles include limiting lawn areas, using plants and trees with low water requirements,

irrigating only when needed, watering during morning or evening hours and improving soils in shrub and garden areas by using mulches.

17.4.5 Pricing

Pricing policies are suggested as a means of reducing per capita water use. Flat rates (same price for each unit of water) provide little incentive for consumers to conserve. Decreasing block rates (lower unit prices for larger volume) provide even less conservation incentive. "Take or pay" contracts, which provide water purveyors with the guaranteed revenue stream needed for bonding, do not promote any conservation below the contracted amount. Increasing block rates provide a greater conservation incentive for consumers. Under this pricing policy, consumers experience an increasing unit price for higher water consumption. To be effective, the increasing block rate must be substantial and would probably require strong public support.

One city, Tooele, has established a pricing structure that has an increasing unit price for overages. See Table 17-1. These unit price increases, however, are minimal and provide a small incentive to conserve. Grantsville and Stockton charge a flat rate for all water use above the base amount. Wendover's rate of $2.30 per 750 gallons is one of the highest in the state and provides a strong incentive for efficient use.

Setting water prices to encourage more efficient use requires consideration of several principles. They are as follows:

- **A conservation rate structure encourages a lower water use rate without causing a shortfall in system revenues.** To avoid revenue shortages the rate schedule should provide a base charge that is set to cover all fixed cost - those which do not vary with the amount of water delivered. It will cover all debt service, insurance, personnel etc. which must be paid regardless of how much water is taken from the system. All customers pay this charge whether they use any water or not. Variable costs - those that do vary with the amount of water delivered - should be covered by the volume charge, or what is often called the overage rate. Revenue from this part of the rate will vary with the amount of water delivered to customers and should cover the costs of all energy, treatment chemicals, etc.
- **A conservation rate structure provides for the identification of waste, rewards efficient use and penalizes excessive use.** In larger communities with more sophisticated billing and customer relations staffs, water use targets can become part of the conservation program with currently available weather station technologies, phone modems and computer billing programs. With targets in place for each customer, water over-use is readily identified, as are exemplary water efficient behaviors.
- **A conservation rate structure produces excess revenues from penalty rates that can be used to fund needed water conservation programs.** Water conservation comes at a cost. This cost can be added to the commodity portion of the rate, raising the price of each gallon of water delivered to the customer's meter. Revenue generated by the conservation portion of the rater schedule should be placed in a dedicated account and used to pay the cost of water conservation programs.
- **A conservation rate structure is supported by a water bill that clearly communicates the cost of wasted water to the responsible person.** The ideal water bill would present a target usage based on weather, landscaped area and other pertinent use factors; the amount of water delivered above (or below) the target use; and the rate (price) charged for the target usage and any excess. With this information, the customer is equipped with the information

Table 17-1
Water Rates for Selected Communities

City/Town	Base Rate $	Base Allocation (gallons)	first overage ($/750 gallons)	up to (gallons)	second overage ($/750 gallons)	up to (gallons)
Tooele	10.00	0	.65	7,500	.70	unlimited
Grantsville	15.00	7,000	.70	unlimited		
Wendover	17.20	7,500	2.30	unlimited		
Stockton	17.00	16,000	1.06	unlimited		

needed to make intelligent choices about such things as landscape changes, spraying the driveway, washing the car, filling the pool and allowing teenagers to take half hour showers.

- **A conservation rate structure is supported by a person or staff who can respond to customer calls for help in reducing water usage**. Individual home owners who desire to stay within their targets and request assistance can be visited, given a soil probe and taught to properly irrigate their lawns and gardens. Water audits for golf courses, school grounds and other large areas can be provided by trained staff personnel or by private or extension service irrigation specialists.

Water rates can be structured in several ways, each of which uphold the above principles in whole or in part. A series of three tables are use to demonstrate two common rate structures and one that is relatively new to system managers and customers in Utah. to system managers.

The flat rate is very simple to administer and to understand. A base charge is paid every month regardless of water use. All water delivered through the water meter is charged at a flat rate. Table 17-2 shows how this rate structure works in a hypothetical family for one year.

The increasing block rate is more complex but simple to administer if the water supplier has the proper computer billing hardware and software. Table 17-3 shows how this rate structure works in a hypothetical family for one year.

Both the flat and increasing block rates can be constructed to encourage efficient water use without causing a shortfall in revenue. This can be done by having the base charge set to cover fixed costs and the commodity charge set to cover variable costs.

Neither has a specific feature to identify wasteful or efficient behaviors. Under both, a water bill could be devised to show how much water is being used. A charge for each overage may encourage more efficient use. Both rate structures can be supported by a staff who responds to customer calls for help in reducing water use.

The ascending block rate is more complex. It provides a water use target for each customer based on size of landscaped area, family size and current weather conditions as measured by evapotranspiration. Irrigation application efficiency is also accounted for in setting the targets. Table 17-4 shows how this rate structure works in a hypothetical family for one year.

17.4.6 Secondary or "Dual" Systems

Secondary water systems, also known as "dual" water systems, provide untreated water of moderate quality for outdoor uses, primarily lawn-watering and gardening. The construction of these systems allows the use of lower quality

Table 17-2
FLAT RATE WATER PRICING

Month	Usage (kgal)	Base Charge ($)	Commodity Charge ($1.10/kgal)	Total ($)
Jan	5	10.00	5.50	15.50
Feb	6	10.00	6.60	16.60
Mar	9	10.00	9.90	19.90
Apr	13	10.00	14.30	24.30
May	38	10.00	41.80	51.80
Jun	48	10.00	52.80	62.80
Jul	53	10.00	58.30	68.30
Aug	48	10.00	52.80	62.80
Sep	29	10.00	31.90	41.90
Oct	13	10.00	14.30	24.30
Nov	9	10.00	9.90	19.90
Dec	6	10.00	6.60	16.60
TOTALS	277	120.00	305.80	424.70

Table 17-3
INCREASING BLOCK WATER PRICING

Month	Usage (kgal)	Base Charge ($)	Overage ($)			Total ($)
			0 gal to 10 kgal $0.90	10 gal to 20 kgal $1.00	Over 20 kgal $1.25	
Jan	5	10.00	4.50			14.50
Feb	6	10.00	5.40			15.40
Mar	9	10.00	8.10			18.10
Apr	13	10.00	9.00	3.00		23.00
May	38	10.00	9.00	10.00	22.50	51.50
Jun	48	10.00	9.00	10.00	35.00	64.00
Jul	53	10.00	9.00	10.00	41.25	70.25
Aug	48	10.00	9.00	10.00	35.00	64.00
Sep	29	10.00	9.00	10.00	11.25	40.25
Oct	13	10.00	9.00	3.00		22.00
Nov	9	10.00	8.10			18.10
Dec	6	10.00	5.40			15.40
TOTALS	277	120.00	94.50	58.00	145.00	416.50

Table 17-4
ASCENDING BLOCK WATER PRICING

Month	Usage (kgal)	Base Charge ($)	Target use (kgal)	Irr Req[1] (ac-In)	Discount @ $.83	Conserve use @ $1.10	Ineff.[2] Use @ $2.20	Wasteful Use @ $4.40	Irres.[3] Use @ $8.80	Total
Jan	5	10.00	15	0	4.13					14.13
Feb	6	10.00	15	0	4.95					14.95
Mar	9	10.00	15	0	7.43					17.43
Apr	13	10.00	29.75	0.2	10.73					20.73
May	38	10.00	39.59	2.0		41.80				51.80
Jun	48	10.00	45.60	3.9		50.16	5.27			65.44
Jul	53	10.00	48.92	4.7		53.81	8.97			72.79
Aug	48	10.00	45.60	3.9		50.16	5.27			65.44
Sep	29	10.00	33.44	1.7		36.78				46.78
Oct	13	10.00	29.75	0.2	10.73					20.73
Nov	9	10.00	15	0	7.43					17.43
Dec	6	10.00	15	0	4.95					14.95
Totals	277	120.00	347.65	16.6	50.35	232.71	19.51			422.56

Days in Billing Period = 30 Appl. Effic. = .65 Indoor use = 100 gpcd
Irr. Area = .21 ac. Family Size = 5
1) Irrigation requirements for turf grass of a typical northern Utah residence
2) Inefficient use
3) Irresponsible use

(untreated) water on lawns and gardens freeing up the existing high quality water for meeting growth. Because these systems require the construction of an additional water conveyance infrastructure, they can be expensive. Since retrofitting can be expensive, it is doubtful many new secondary water systems will be constructed in existing communities. In areas of new construction where an adequate secondary water supply exists, secondary systems may prove economical. However, secondary water systems are economical if the construction costs are less than the cost of enlarging the M&I system to meet future needs and the costs associated with treating the water to drinking water standards.

While there may be an economic incentive for building secondary water systems based on the cost of high quality treated water conserved, studies have shown that “secondary” systems do not promote overall water conservation. Since secondary water is less expensive than treated water and is seldom metered, consumers tend to use more of it when watering their lawns. Research is ongoing to build a meter that will stand up to untreated water. This would enable the metering of secondary water systems which would allow the implementation of pricing which would help control use.

17.4.7 Conjunctive Use

Conjunctive use of water supplies (also called "joint use") most often refers to the combined use of surface water and groundwater. Where both are available as a water supply, groundwater can be allowed to accumulate

during wet years, and then pumped, as needed, in dry years to supplement surface water supplies. This is an excellent example of wise use because it manages the total water supply, maximizing system efficiency.

Similarly, treated and untreated water can be used jointly to conserve water as well as reduce costs. A secondary system to distribute untreated water for lawns and gardens allows use of a smaller system capacity of expensive treated water. A substantial portion of high-quality water in public systems is customarily used for lawn and garden watering.

17.4.8 Restricting Water Use

To make enough water available for necessary household and commercial use during periods of severe drought, the use of municipal water for lawn and garden watering and other outside uses has periodically been restricted in Utah. One of the easiest restrictions to monitor and enforce is to prohibit outside use during certain times of the day. In the most severe cases, all outside use has been temporarily prohibited. The public has accepted these restrictions when they understand the necessity and realize the situation is temporary. But it is doubtful the public would accept such restrictions if they perceived them to be unnecessary or artificially contrived.

Tooele City Golf Course (under construction)

Because of the loss of water to evaporation on hot summer days, some water districts prohibit lawn watering between the hours 10 a.m. to 6 p.m. The estimated loss from evaporation during these hours is 10 to 15 percent of the applied water. Restriction of daytime watering is a recommendation of the Utah Water Conservation Advisory Board and could be implemented rather easily in most jurisdictions.

17.4.9 Wastewater Reuse

One effective method of conserving existing water supplies would be to establish a system of reuse. To some extent, current water supplies are reused as return flows from irrigation fields and effluent from wastewater treatment plants flows back into the natural waterways and underground aquifers. Tooele has been using effluent to irrigate alfalfa and has plans to use effluent to water a golf course in the near future. No direct reuse or recycling of wastewater for drinking water use has been universally accepted in the United States, except in emergency situations. However, reuse of wastewater for industrial, agricultural and other uses, such as golf course watering, is becoming more common. In the future, water reuse may become a more valuable tool in conserving the existing water supply.